#11/declaration w/attachments
V Bepuyn
7/17/03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
	)	
Hirst, et al.	)	Group Art Unit: 2852
	)	
Serial No.: 09/819,925	)	Examiner: Tran, Hoan H.
	)	
Filed: March 28, 2001	)	Docket No.: 10004411-1
	)	
For: Fusing System Including an External Heater	)	

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage prepaid, in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450, on

7-7-03

Mary Meegan

Signature – Mary Meegan

DECLARATION OF B. MARK HIRST PURSUANT TO 37 C.F.R. §1.131

Commissioner of Patents
Washington, D.C. 20231

Sir,

I, **B. Mark Hirst**, hereby declare that:

1) The invention embodied in the above-identified patent application is directed to fusing systems and devices that incorporate such fusing systems.

2) I am advised that the United States Patent and Trademark Office has rejected one or more claims presently pending in the above-identified patent application based, at least in part, upon United States Patent No. 6,463,250 to *Chen et al.* ("*Chen '250*"). I am further advised that the effective filing date of the *Chen '250* patent is October 4, 2000.

3) The invention, however, as embodied in the claims of the present invention was completed by myself and my co-inventors in this country prior to October 4, 2000. Specifically,

the invention was "completed" by virtue of reduction to practice prior to the October 4, 2000 filing date of the *Chen '250* patent.

4) As evidence that the present invention was so characterized by reduction to practice, Exhibit "A" is attached hereto.

5) Exhibit "A" is a copy of notebook entries from my notebook number 4276. As indicated on pages 37-42 of this notebook, an embodiment of the claimed invention was made and tested with positive results. All of these activities occurred prior to the October 4, 2000 critical date. Note that all dates contained on pages 37-42 have been redacted.

I hereby declare that all statements made herein are of my own knowledge are true and that all statements are made on information and belief and are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

July 3, 2003
Date

B. Mark Hirst

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
	)	
Hirst, et al.	)	Group Art Unit: 2852
	)	
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7-7-03

Mary Meegan

Signature – Mary Meegan

DECLARATION OF KENNETH E. HEATH PURSUANT TO 37 C.F.R. §1.131

Commissioner of Patents
Washington, D.C. 20231

Sir,

I, **Kenneth E. Heath**, hereby declare that:

1) The invention embodied in the above-identified patent application is directed to fusing systems and devices that incorporate such fusing systems.

2) I am advised that the United States Patent and Trademark Office has rejected one or more claims presently pending in the above-identified patent application based, at least in part, upon United States Patent No. 6,463,250 to *Chen et al.* ("*Chen '250*"). I am further advised that the effective filing date of the *Chen '250* patent is October 4, 2000.

3) The invention, however, as embodied in the claims of the present invention was completed by myself and my co-inventors in this country prior to October 4, 2000. Specifically,

the invention was "completed" by virtue of reduction to practice prior to the October 4, 2000 filing date of the *Chen '250* patent.

4) As evidence that the present invention was so characterized by reduction to practice, Exhibit "A" is attached hereto.

5) Exhibit "A" is a copy of notebook entries from Mark Hirst's notebook number 4276. As indicated on pages 37-42 of this notebook, an embodiment of the claimed invention was made and tested with positive results. All of these activities occurred prior to the October 4, 2000 critical date. Note that all dates contained on pages 37-42 have been redacted.

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7-7-03 Kenneth E Heath

Date Kenneth E. Heath

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
	)	
Hirst, et al.	)	Group Art Unit: 2852
	)	
Serial No.: 09/819,925	)	Examiner: Tran, Hoan H.
	)	
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7-7-03

Mary Meegan

Signature – Mary Meegan

DECLARATION OF MARK WIBBELS PURSUANT TO 37 C.F.R. §1.131

Commissioner of Patents
Washington, D.C. 20231

Sir,

I, **Mark Wibbels**, hereby declare that:

1) The invention embodied in the above-identified patent application is directed to fusing systems and devices that incorporate such fusing systems.

2) I am advised that the United States Patent and Trademark Office has rejected one or more claims presently pending in the above-identified patent application based, at least in part, upon United States Patent No. 6,463,250 to *Chen et al.* ("*Chen '250*"). I am further advised that the effective filing date of the *Chen '250* patent is October 4, 2000.

3) The invention, however, as embodied in the claims of the present invention was completed by myself and my co-inventors in this country prior to October 4, 2000. Specifically,

the invention was "completed" by virtue of reduction to practice prior to the October 4, 2000 filing date of the *Chen '250* patent.

4) As evidence that the present invention was so characterized by reduction to practice, Exhibit "A" is attached hereto.

5) Exhibit "A" is a copy of notebook entries from Mark Hirst's notebook number 4276. As indicated on pages 37-42 of this notebook, an embodiment of the claimed invention was made and tested with positive results. All of these activities occurred prior to the October 4, 2000 critical date. Note that all dates contained on pages 37-42 have been redacted.

I hereby declare that all statements made herein are of my own knowledge are true and that all statements are made on information and belief and are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

7-7-03

Date

Mark Wibbels

EXHIBIT "A"

Project No.

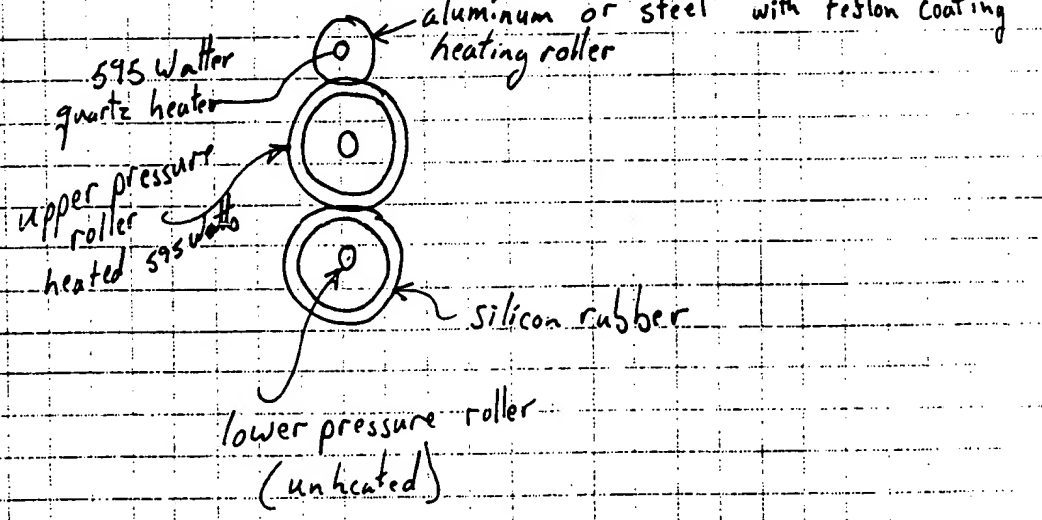
TITLE Fusing System [redacted] external heating roller [redacted] No.

From Page No.

Present two roller fusing systems utilize aluminum rollers which are typically covered by a thick layer (4mm) of silicon rubber to maximize the width of the nip area for improved fusing. The silicon rubber is a poor thermal conductor which results in a fusing system which requires an excessive amount of time to bring to working temperatu

For example, the HP 8500 laser printer requires 4 minutes + 20 seconds to achieve a working temperature of 180°C (starting from 23°C.) with two heated rollers eac heated by 595 Watt (1190 watts) quartz lamps. Using an external heated met roller eliminates a great portion of the thermal time delay in the sys

The following system was prototyped with 2 595 heater lamps:



This system reduced warmup time to 2 minutes 50 seconds fr 23°C to 180°C.

To Page No.

Witnessed & Understood by me, [redacted] Date

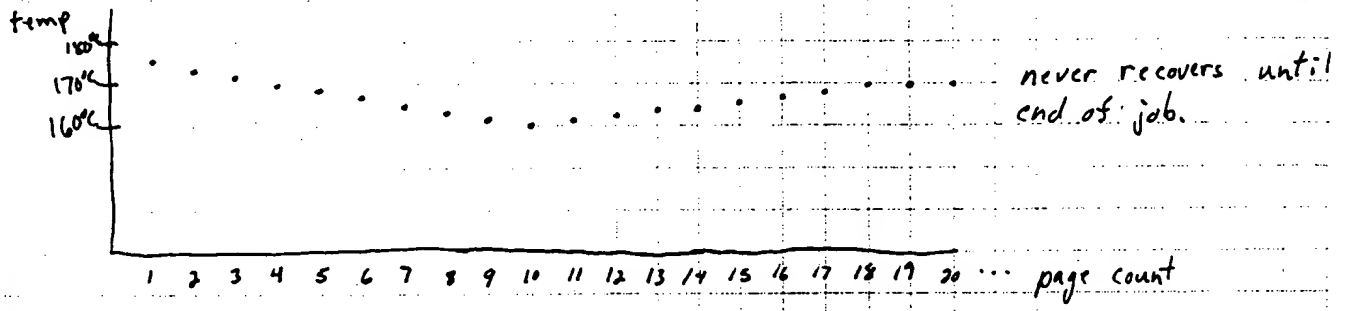
Invented by Mark Wilson Date

Recorded by Mark Hunt

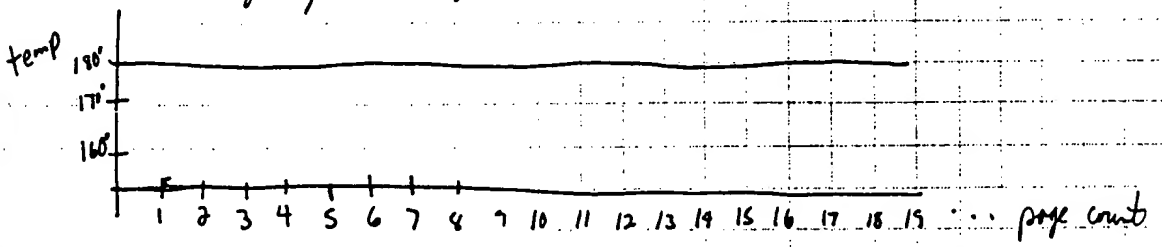
From Page No. 37

Experiments show some additional important benefits. These are: very quick response to thermal loads as well good ride through of sustained thermal loading. additionally there is no decrease in the gloss of fused toner from one page to the next. The temperature of the fusing system recovers instantly ~~of~~ ~~as~~ when the thermal load exits the nip of the fusing er pressu rollers.

typical The ride through of present system shows considerable sag. (1)



Ride through of new system



The sag in the ride through (1) causes the gloss of the fused toner to decrease with every page.

To Page No. 3

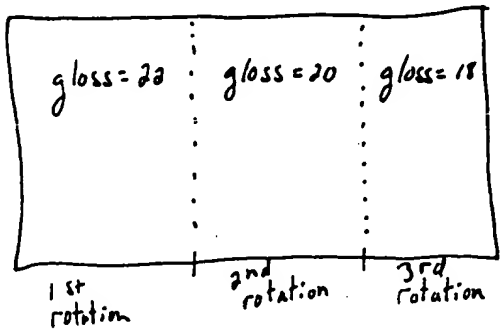
Witnessed & Understood by me.	Date	Invented by Mark Hurst	Date
		Recorded by Mark Hurst	

From Page No. 39

This system also shows that the teflon coatings and silicon rubber of the pressure rollers can operate reliably at temperatures in excess of 210°C. Tests will be conducted with the surface of the external heating roller at 220°C, 230°C, and 240°C printing 100,000 pages.

One problem with this design as well as many other designs is that the silicon rubber and teflon coatings are isulators and are poor heat conductors as well as possess a small capacity to store heat energy at the surface. This causes the gloss of the fused toner to decrease over the fused page with each full rotation of the pressure rollers.

- For example for a ledger page the gloss for a solid red secondary color a



fortunately with the external heater the system recovers for the next page.

To Page No. 4

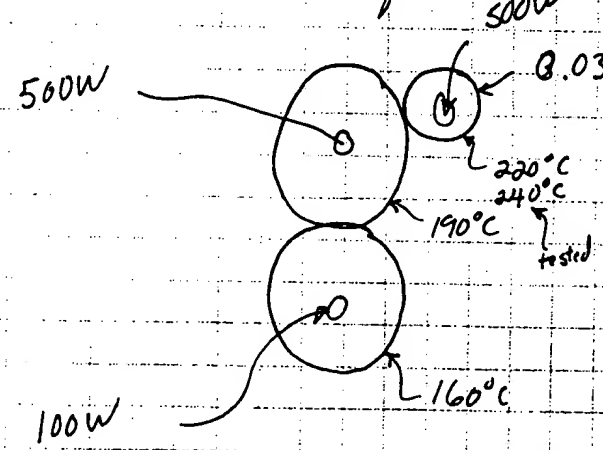
Witnessed & Understood by me,	Date	Invented by Mark Hurd	Date
		Recorded by Mark Hurd	

From Page No. 39

To combat the problem of gloss sag within the page it is necessary to improve the amount of heat that can be carried into the nip of the fuser pressure rollers. A very thin metal layer at the surface of the upper pressure roller should do the trick. This idea is detailed on page 45 of this note book.

A prototype of this system was built with the following:

System built to test resiliance of silicon rubber and teflon to 220°C external h



- as of , , , 44,000 pages have been printed on above system with no failures. a second prototype in which the external heater is controlled at 2 or 240°C will be constructed

, , , 64,000 pages printed with no problems

, , , 240,000 pages printed on two fusers with no problems

, , , 300,000 pages printed on two fusers with no problem

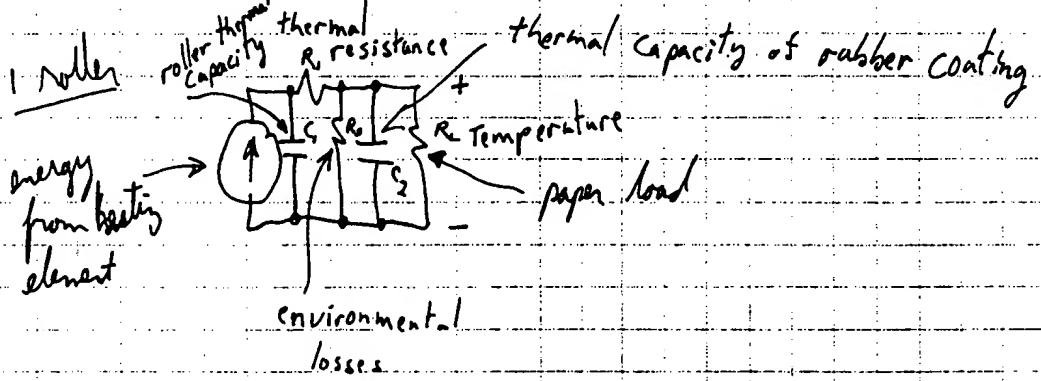
To Page No

Witnessed & Understood by me,	Date	Invented by Mark Hunt	Date
		Recorded by Mark Hunt	

From Page No. ___

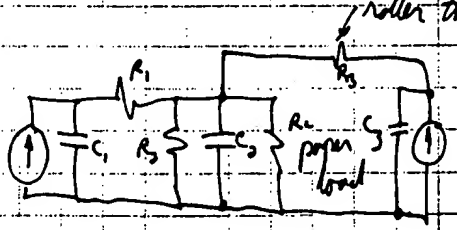
These life tests show no degradation of fuser roller material when heated via contact rolling with 240°C heating roller. This is a 3X life test on two different fusers.

a thermal model for present system is as follows



the problem is that the high thermal resistance of the compliant surface limits energy transport from the fuser.

the external heating roller significantly decreases the thermal resistance of the system by applying energy directly to the surface of the fuser

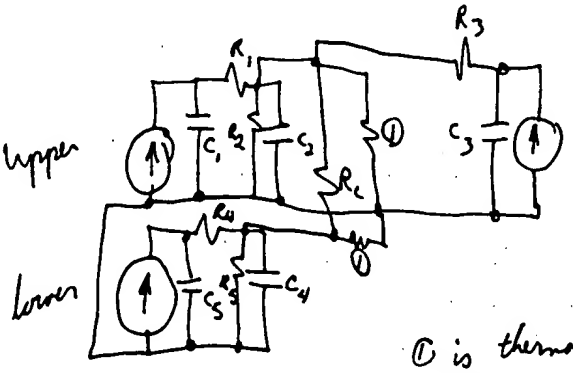


To Page No. 4

Witnessed & Understood by me,	Date	Invented by Mark Hood	Date
		Recorded by Mark Hood	

From Page No. __

with both rollers & external heater



external heated roller against upper roller

① is thermal load of paper as it travels between the fuser pressure rollers

R_c is coupling between upper and lower rollers

Memo HPC-0405-1459-N02 details temperature comparison experiments.

Witnessed & Understood by me,	Date	Invented by Mark Hunt	Date / /
		Recorded by Mark Hunt	/ /